

Intro to Titration Lab

Objective: To determine practice titration techniques and run a titration to the end point while finding the molarity of an unknown concentration of hydrochloric acid.

Background: Titration involves the addition of a solution whose concentration is known to a solution whose concentration is unknown. The volume of the known solution required to react completely with a known volume of the solution whose concentration is being determined is measured. An indicator is added to the solution to mark the point at which the two quantities reach equivalence.

In this experiment sodium hydroxide of known concentration will be added to a known volume of hydrochloric acid to determine the molarity of the sodium hydroxide. Phenolphthalein will be used as the indicator. Phenolphthalein is pink in a basic solution and clear in an acidic solution.

Safety: ONLY ADD BASES TO BURET. Wear goggles– both acids and bases are corrosive and can cause eye and/or skin damage.

Do not pour the NaOH above eye level. Lower the buret below eye level before filling it.

Disposal: Pour the contents of the Erlenmeyer flask down the drain. Follow your teacher's directions for any remaining acid or base.

Materials:

Ring stand	1 Erlenmeyer flask	phenolphthalein
Buret	DI water	0.5 M NaOH
Clamp	10 mL syringe	unknown acid (HCl) M
2 beakers	funnel	100 mL graduated cylinder

Procedures:

1. Set up the ring stand, buret, and buret clamp. Make sure that the buret remains vertical at all times.
2. Add some DI (~10ml) water to the buret to check for leaks. If there are no leaks, drain the DI water completely from the buret.
3. Carefully add the NaOH (~ 45ml) to the buret. You will need to drain some (2-5ml) of the NaOH from the buret to fill the tip. Fill the buret so that the meniscus of the NaOH is sitting below the 0.00 mL mark with the tip filled.
4. Record the initial volume of the buret
5. Using the graduated cylinder add about 25 mL of DI water to a 125/250 mL Erlenmeyer.
6. Using a clean graduated cylinder add exactly 10 mL of the unknown acid to the water in the Erlenmeyer flask.
7. Add 2 – 3 drops of phenolphthalein to the acid solution in the Erlenmeyer flask.
8. Place the Erlenmeyer under the buret. Place a sheet of white paper under the Erlenmeyer.
9. You are now ready to begin titrating. Carefully add about 1 mL of the NaOH from the buret to the Erlenmeyer flask and swirl to mix. Continue adding 1 mL increments until you begin to see a pink color. The pink color should appear briefly and then quickly disappear.

10. Once you have seen the pink color, begin adding the NaOH slowly and in smaller amounts. Remember to swirl the flask after each addition of NaOH. As you near the endpoint, the pink color should stay longer, but will still disappear when the flask is swirled. The longer the pink color stays, the smaller your next increment of NaOH should be. You want to eventually be adding the NaOH **one drop at a time** until the palest pink color appears and stays.
11. When the pale pink color appears and stays you have reached the endpoint. Record the buret reading to the nearest 0.01 mL as final.
12. Clean out the Erlenmeyer flask and repeat steps 4 – 10 twice more (the Erlenmeyer does not need to be dry, only clean). The solution in the Erlenmeyer can be poured down the drain. You will not need to add more NaOH to the buret for the second trial. Before you start the third trial, make sure that you have enough NaOH in the buret to complete the titration (use your values from the first and second trials to estimate the amount needed for the third trial).
13. Clean out the Erlenmeyer and dispose of any remaining acid or base according to your teachers instructions.

Data:

Title an area in you notes: Intro to Titration and draw the following table in your notes. You will record all data in you notes as we will refer to this later in the unit.

	Trial 1	Trial 2	Trial 3	Trial 4
Molarity of NaOH				
Initial Buret reading (ml)				
Final Buret reading (ml)				
Amount of NaOH despensed (ml)				
Vol. of Unknown acid used (ml)				
Molarity of unknown acid				

With your partner:

1. What was the average volume of the NaOH despensed from the buret?
2. Write a balanced equation for the reaction in this titration.